

Starting ASCI - possible lessons to be learned



The Problem

July 3, 1993

President Clinton:



- Continue Moratorium on Testing
- Seek a Comprehensive Test Ban Treaty
- And Direct the DOE to:

"establish a stewardship program to ensure the preservation of the core intellectual and technical competencies of the U.S. in nuclear weapons."

Goal:

Develop simulation tools to attack problem

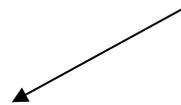
Assets in 1993:

3 labs,
“Supercomputing” industry

Defense Programs advanced computing budget ~ \$10 M/yr

TOP 500 list - June 1993

Speed in Gigaflops



1	TMC CM-5/1024/ 1024	59.70 131.00	Los Alamos National Laboratory USA/
2	TMC CM-5/1024/ 1024	59.70 131.00	National Security Agency USA/
3	TMC CM-5/544/ 544	30.40 70.00	Minnesota Supercomputer Center USA/
4	TMC CM-5/512/ 512	30.40 66.00	NCSA USA/
5	NEC SX-3/44R/ 4	23.20 26.00	NEC Fuchu Plant Japan/1990
6	NEC SX-3/44/ 4	20.00 22.00	Atmospheric Environment Service (AES) Canada/1991
7	TMC CM-5/256/ 256	15.10 33.00	Naval Research Laboratory (NRL) USA/1992
8	Intel Delta/ 512	13.90 20.48	Caltech USA/
9	Cray/SGI Y-MP C916/16256/ 16	13.70 15.24	Cray Research USA/
10	Cray/SGI Y-MP C916/16256/ 16	13.70 15.24	DOE/Bettis Atomic Power Laboratory USA/1993
17	Cray/SGI Y-MP C916/16256/ 16	13.70 15.24	Lawrence Livermore National Laboratory USA/1992
116	Cray/SGI Y-MP8/864/ 8	2.14 2.67	Sandia National Labs USA/



Management Specifications:



Talk to designers - not geeks

Get with non-geek computer company:
align with a commercial business model

Each lab a leader

Work toward a measurable goal

Numerical Goal

No of operations/run time of problem

Resolution - size of feature

Dimension - 3D

Physics fidelity - a lot

Run time: 2 weeks

100 teraflops (100,000 gigaflops)

By 2004 - designers “gone”

Validation with real designers.

Subsequent Management Specifications

1) Visualizing of results - designers like to look

2) Academic alliances

- fill the pipeline with smarties
- validation on “testable” large multidisciplinary problems



Team



TOP 500 list - November 2005

Speed
in gigaflops

Rank	Site	Computer	Processors	Year	R _{max}	R _{peak}
1	DOE/NNSA/LLNL United States	BlueGene/L - eServer Blue Gene Solution IBM	131072	2005	280600	367000
2	IBM Thomas J. Watson Research Center United States	BGW - eServer Blue Gene Solution IBM	40960	2005	91290	114688
3	DOE/NNSA/LLNL United States	ASC Purple - eServer pSeries p5 575 1.9 GHz IBM	10240	2005	63390	77824
4	NASA/Ames Research Center/NAS United States	Columbia - SGI Altix 1.5 GHz, Voltaire Infiniband SGI	10160	2004	51870	60960
5	Sandia National Laboratories United States	Thunderbird - PowerEdge 1850, 3.6 GHz, Infiniband Dell	8000	2005	38270	64512
6	Sandia National Laboratories United States	Red Storm Cray XT3, 2.0 GHz Cray Inc.	10880	2005	36190	43520
7	The Earth Simulator Center Japan	Earth-Simulator NEC	5120	2002	35860	40960
8	Barcelona Supercomputer Center Spain	MareNostrum - JS20 Cluster, PPC 970, 2.2 GHz, Myrinet IBM	4800	2005	27910	42144
9	ASTRON/University Groningen Netherlands	Stella - eServer Blue Gene Solution IBM	12288	2005	27450	34406.4
10	Oak Ridge National Laboratory United States	Jaguar - Cray XT3, 2.4 GHz Cray Inc.	5200	2005	20527	24960
18	Los Alamos National Laboratory United States	ASCI Q - AlphaServer SC45, 1.25 GHz Hewlett-Packard	8192	2002	13880	20480

Start-up lessons from ASCI:

Define the Problem(s)

Develop measurable goals

Find leader(s)

Build team (industry, labs, academia,international)

